Internet Architecture

Lecture 11:
How Web Pages and Web Browsers Work

How Web Pages Works

The World Wide Web is the fastest growing and, in many ways, the most exciting and intriguing part of the Internet.

As its name implies, the World Wide Web is a globally connected network. The Web contains many things, but what makes it so fascinating to so many are the web "pages" that incorporate text, graphics, sound, animation, and other multimedia elements. In essence, each page is an interactive multimedia publication that can include videos and music as well as graphics and text.

Pages are connected to one another using *hypertext* that allows you to move from any page to any other page, and to graphics, binary files, multimedia files, as well as any Internet resource. To jump from one page to another, you click a hypertext link that connects web pages and resources.

How Web Page Works

The Web operates on a client/server model. You run web client browser software, such as Netscape Navigator or Microsoft's Internet Explorer, on your computer. That client contacts a web server and requests information or resources. The web server locates and then sends the information to the web browser, which displays the results.

Pages on the Web are built using a markup language called Hypertext Markup Language (HTML). The language contains commands that tell your browser how to display text, graphics, and multimedia files. It also contains commands for linking the page to other pages and to other Internet resources.

The term home page often is used to refer to the first, or top, page in a collection of pages that make up a website. This is to distinguish it from the many pages collected together as a single "package" of sorts that often make up websites. Usually, it acts as an introduction to the site, explaining its purpose and describing the information found on other pages throughout the site.

How Web Page Works

In general, websites use three types of organizational structures to organize their pages. In a *tree structure*, a pyramid or an outline format enables users to easily navigate through the site and find the information they want. In a *linear structure*, one page leads to the next, which then leads to the next, and so on, in a straight line. Finally, in a *random structure*, pages are connected to one another seemingly at random.

How the World Wide Web Works

     1* The World Wide Web is the most innovative and most-used part of the Internet. When you browse the Web, you view multimedia pages composed of text, graphics, sound, and video. The Web uses hypertext links that allow you to jump from one place to another on the Web. The language that enables you to use hypertext links and to view web pages is called Hypertext Markup Language, more commonly known as HTML.

How the World Wide Web Works

2 The Web works on a client/server model in which client software—known as a *web browser*—runs on a local computer. The server software runs on a web host. To use the web, you first make an Internet connection and then launch your web browser.

How the World Wide Web Works

3 In a web browser, you type the URL for a location you want to visit or click a link that sends you to the desired location. The names for web locations are uniform resource locators (URLs). Your web browser sends the URL request using Hypertext Transfer Protocol (HTTP), which defines the way the web browser and web server communicate with each other.

How the World Wide Web Works

4 When the server finds the requested home page, document, or object, it sends that home page, document, or object back to the web browser client. The information is then displayed on the computer screen in the web browser. When the page is sent from the server, the HTTP connection is closed and can be reopened.

How the World Wide Web Works

5 The web server receives the request using the HTTP protocol. The request tells the server which specific document is being requested and where that document is located.
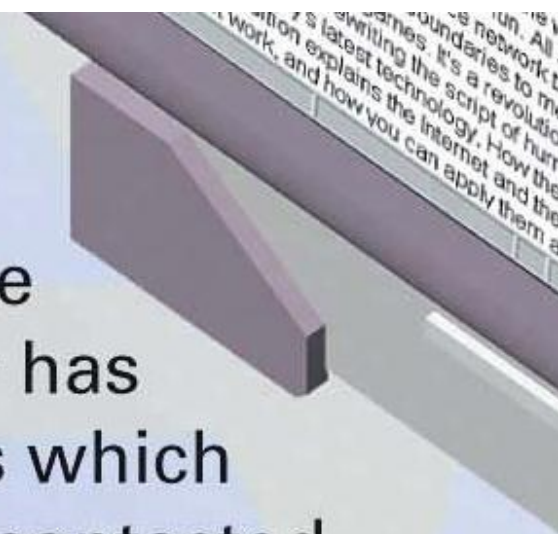
How the World Wide Web Works

6 The request is sent to the Internet. Internet routers examine the request to determine which server to send the request to. The information just to the right of the http:// in the URL tells the Internet on which web server the requested information can be found. Routers send the request to that web server.

How the World Wide Web Works

7 URLs contain several parts. The first part—the http://—details which Internet protocol to use. The second part—the part that usually has a www in it—sometimes indicates which type of Internet resource is being contacted. The third part—such as zdnet.com—can vary in length and identifies the web server to be contacted. The final part identifies a specific directory on the server and a home page, document, or other Internet object.

How Web Browser Works

Like much of the Internet, the World Wide Web operates on a client/server model. You run a web client on your computer called a web browser such as Microsoft's Internet Explorer or Firefox. That client contacts a web server and requests information or resources. The web server locates and then sends the information to the web browser, which displays the results.

How Web Browser Works

When web browsers contact servers, they're asking to be sent pages built with Hypertext Markup Language (HTML). Browsers interpret those pages and display them on your computer. They also can display applications, programs, animations, and similar material created with programming languages such as Java and ActiveX, scripting languages such as JavaScript, and techniques such as AJAX.

How Web Browser Works

Sometimes, home pages contain links to files the web browser can't play or display, such as sound or animation files. In that case, you need a plug-in or a helper application. You configure your web browser or operating system to use the helper application or plug-in whenever it encounters a sound, animation, or other type of file the browser can't run or play.

Plug-in: *A piece of software that installs in a browser or works in concert with a browser, such as for displaying different types of video.*

How Web Browser Works

Over the years, web browsers have become increasingly sophisticated. Browsers are now complete software suites that can do everything from video conferencing to letting you create and publish HTML pages.

Increasingly, a browser is not just a single piece of software, but an entire suite. The newest version of Internet Explorer, for example, includes security features such as an anti-phishing filter. The Firefox browser has a companion piece of email software called Thunderbird that can be downloaded as well.

How Web Browser Works

When browsing the Internet, one of the most frustrating experiences is the error messages browsers display when they're having trouble contacting a website. Depending on which browser you use, and which version of the browser you're using, those messages might differ. Sometimes browsers display error messages.

What Common Browser Error Messages Mean

Server Does Not Have a DNS Entry—When you type a URL in your browser to visit a site, your computer contacts a server called a Domain Name System (DNS) server. The DNS server translates the URL into the IP number that computers can understand— and after it does that, your browser can go to the site.

If you get an error message telling you the server doesn't have a DNS entry, it means that the server doesn't have a listing for the URL you typed. This usually means either you typed the URL incorrectly or something is wrong with the DNS server. Check the URL and retype it.

What Common Browser Error Messages Mean

503 Service Unavailable—This is a catch-all error message for a variety of problems, but all of them mean that the website is incapable of contact by your browser. The problem might be the site's server has crashed because of too much traffic or there's network congestion.

What Common Browser Error Messages Mean

403.9 Access Forbidden. Too Many Users Are Connected—Some websites recognize that if they get too much traffic at once, the entire site can be brought down and no one will be able to visit. Those sites put a limit on the number of people who can come to the site at once—that way, the site is always available, even if not everyone who wants to visit can get in. If you get this "Too Many Users Are Connected" message, it usually means that the website is up and running, but you can't get in because the maximum number of people are already on the site. Keep trying—when one person leaves, another can come in, and it might be you.

What Common Browser Error Messages Mean

404 Not Found—When you get this message, you've arrived at the correct website, but the specific page you're looking for can't be found. That specific page might have been deleted from the site or moved—or you might have typed the location incorrectly.

What Common Browser Error Messages Mean

401 Unauthorized or 403 Forbidden—If you get either of these error messages, you're trying to enter a website that allows only certain people in—and it's not allowing you to enter. Typically, these types of websites are password protected and also might allow only visitors who are from certain domains, such as zd.com. If you've entered a password, you might have entered it improperly, or you might not be in a domain that's allowed to enter the website.

What Common Browser Error Messages Mean

Spinning hourglass—This isn't an error message your browser displays—instead, your Windows cursor turns into a spinning hourglass. The spinning hourglass tells you that your browser is trying to make a connection to a website. If it keeps spinning and a connection is never made, it can mean that an Internet router someplace between where you are and where you're trying to visit has crashed and you can't make the connection. It can also mean that you've lost your local Internet connection for some reason.

Thank you